REMARKS

The comments of the applicant below are each preceded by related comments of the examiner (in small, bold type).

5. Claim 28 is allowed.
The following is a statement of reasons for the indication of allowable subject matter: Prior art of record does not disclose, in single or in combination, p-th layer switches configured to swap signals that differ only in the p-th coordinates with coordinates in other dimensions being the same, p ranging from 1 to D, and q-th layer switches configured to swap signals that differ only in the (2D-q)-th coordinates with the coordinates in other dimensions being the same, q ranging from D+1 to 2D-1 in combination with other limitations of the claim.

The applicant acknowledges the examiner has indicated that claim 28 is allowed. The applicant contends that the other claims are also patentable for at least the reasons set forth below.

4. Claims 24, 26, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Posner et al. in view of Kato et al. in further view of Beshai US 6,853,635.

Regarding claims 24, 26-27, 30, Posner et al. disclose a computer program stored on computer-readable media for causing computer system to perform steps. Posner et al. disclose the switch points are controlled by computer which receives instructions specifying the desired connections. See column 4, lines 62-67, column 5, lines 1-3. Posner et al. does not explicitly disclose the claimed for each operation, each signal prior to operation has a coordinate that is the same as another signal after the operation. Figure 6 of Instant specification refers to each layer in switch having the coordinate [1,1,1].

Kato et al. discloses optical space switch device with four stages with 2x2 optical switches (Figures 11a-11d), a switch in each stage having a (0,0) coordinate. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify Posner et al. multi-dimensional switch with coordinates of Kato et al. to use to determine between channels transmitted through optical space switch.

Posner et al. and Kato et al. disclose all of the limitations except for computer readable media for assigning D-dimensional coordinate to each set of N signals, in successive operations, changing coordinates of N signals for particular dimension during each operation, such that after successive operations, the coordinates of N signals match a set of target coordinates. Beshai discloses N-dimensional lattice network with plurality of edge modules identified by N coordinates for addressing. Route-sets are computed for edge modules by permuting coordinates of edge modules. See column 2, 52-67, column 3, lines 1-42. At the time the invention was made, it would have been obvious to implement steps of coordinate permutation of Beshai into program code for use by Posner et al. One of ordinary skill in the art would be motivated to do so for efficiency of automated system.

Posner, Beshai, and Kato would not have made obvious in successive operations, changing coordinates of N signals for a particular dimension during each operation, and that for each operation, each signal prior to the operation has a coordinate that is the same as another signal after the operation, as recited in claim 24, because Beshai and Kato describe two different coordinate systems that are incompatible. There would be no motivation or suggestion to combine Posner, Beshai, and Kato.

Kato discloses an optical space switch, in which coordinates are used to show the locations of channels (FIGS. 11(a) to 11(d)). The coordinates are fixed from one stage to another. As can be seen in FIGS. 11(a) to 11(d), each channel has the same coordinates from stages 1 to 4.

Beshai discloses a multi-dimensional lattice network in which a plurality of edge modules have unique identities that are identified by N coordinates. (col. 5, lines 56-60) As shown in FIG. 7 of Beshai, each of the edge modules has a unique coordinate that ranges from (0,0,0) to (Q1-1, Q2-1, Q3-1).

There is no suggestion or motivation to use the unique coordinates of Beshai in Kato. In Kato, the coordinates are used to identify the positions of the channels. Kato's channels do not change positions from one stage to another. If the coordinates change from one stage to another, the coordinates could not be used to represent the positions of the channels.

There is no suggestion or motivation to use the position coordinates of Kato in Beshai. In Beshai, the N coordinates are used for addressing the edge modules within the network (col. 5, lines 56-60). If Kato's position coordinates were used in Beshai, the coordinates of an edge module in one layer would be the same as the coordinates of another edge module in another layer. The position coordinates could not be used to address the edge modules within the network.

1. Claims 1-9, 10-13, 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Posner et al. US 4,807,280 in view of Kato et al. US 5,532,855.

Regarding claims 1, 6-9, the claimed determining integer factors of N, in which represents the number of signals to be permuted is disclosed by Posner et al. by N input lines and to construct a cross-connect switch, the largest prime factor of N, Nc, is determined and is number of input and output lines for center stage switch module. Furthermore, N/ Nc is

decomposed into its prime factors to determine number of stages. See column 5, lines 55-57, lines 66-68, column 6, lines 1-34. The claimed selecting a configuration for layers of a permuting network based on the integer factors of N and one or more pre-selected type of switches and constructing the permuting network in layers by using the one or more pre-selected types of switches based on selected configuration is disclosed by Posner et al. by N input lines and to construct a crossconnect switch, the largest prime factor of N, Nc, is determined and is number of input and output lines for center stage switch module. Furthermore, N/ Nc is decomposed into its prime factors, fj, to determine number of stages. If there are S prime factors, the cross-connect switch will have 2S+1 stages. The cross-connect switch will be symmetric about center stage switch module with fj X fj switch modules. See column 5, lines 55-57, lines 66-68, column 6, lines 1-34. Examiner interprets the pre-selected types of switches to be that a formula is predetermined for modules and according to N, a particular cross-connect switch will have to be construct according to these "preselected" formulas.

Posner et al. does disclose multi-dimensional switch with stages and a plurality of switch modules in each stage. Posner et al. does not explicitly disclose the claimed assigning multi-dimensional coordinates to the switches, each switch having a coordinate that is the same as another switch in the next layer, and coordinates of two switches differ in at most one dimension. Figure 6 of Instant specification refers to each layer in switch having the coordinate [1,1,1].

Kato et al. discloses optical space switch device with four stages with 2x2 optical switches (Figures 11a-11d), a switch in each stage having a (0,0) coordinate. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify Posner et al. multi-dimensional switch with coordinates of Kato et al. to use to determine between channels transmitted through optical space switch.

Posner and Kato do not disclose and would not have suggested a permuting network that is constructed by assigning multi-dimensional coordinates to the switches, each switch having a coordinate that is the same as another switch in the next layer, and "each layer except the last layer having at least two switches that have coordinates that are different from coordinates of switches in corresponding positions in the next layer," as recited in amended claim 1.

For example, Figure 6 of the applicant's specification shows that a switch having coordinates [2,1,1] in layer L1 and a switch in a corresponding position in layer L2 having coordinates [1,2,1]. Figure 6 shows a switch having coordinates [1,2,1] in layer L1 and a switch in a corresponding position in layer L2 having coordinates [2,1,1].

Posner does not disclose assigning multi-dimensional coordinates to the switches. Although Kato discloses using coordinates to represent the locations of channels, the coordinates of each switch in one layer are the same as the coordinates of corresponding switches in the next layer.

Claims 6 and 11 are patentable for at least similar reasons as claim 1.

2. Claims 18-19, 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Posner et al. US 4,807,280.

Regarding claims 18-19, 22-23, the claimed N input and output terminals, N being an integer, N= w1xw2x...xwD, the claimed permuting network that connects input terminals to output terminals constructed from layers of switches that include w1:1, w2:1,...wD:1 switches is disclosed by N input and output lines and to construct a crossconnect switch, the largest prime factor of N, Nc, is determined and is number of input and output lines for center stage switch module. Furthermore, N/ Nc is decomposed into its prime factors to determine number of stages. See column 5, lines 55-57, lines 66-68, column 6, lines 1-34. If there are S prime factors, the cross-connect switch will have 2S+1 stages. The cross-connect switch will be symmetric about center stage switch module with fj X fj switch modules. See column 5, lines 55-57, lines 66-68, column 6, lines 1-34. Examiner interprets the pre-selected types of switches to be that a formula is predetermined for modules and according to N, a particular cross-connect switch will have to be construct according to these "pre-selected" formulas.

Posner et al. discloses all of the limitations of the claims except for each layer has N switches of same type. At the time it would have been obvious to modify Posner to have N switches in all 5 stages of cross connect matrix disclosed in Figure 3. One of ordinary skill in the art would be motivated to do so to permute each input line in each switch of next stage.

3. Claims 20-21, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Posner et al. in view of Larson et al. US 4,833,468 Posner et al. discloses all of the limitations except for first device being computer motherboard and second device being memory, permuting network being field programmable gate array. Larson et al. discloses switch chip, processor and memory (Figures 6 and 7). See column 11, lines 19-24. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify Posner et al. with chips, processor and memory of Larson for efficient data fetching from memory.

Posner does not disclose "a first active device pre-configured to generate *N* signals having a first ordering," and "a second active device pre-configured to accept the *N* signals arranged in a second ordering," as recited in amended claim 18.

The examiner appears to contend that the "input terminal" and "output terminal" of Posner correspond to the "first device" and "second device," respectively, of claim 18. However, neither the input nor output terminals are active devices.

What is missing in Posner is also not disclosed and would not have been suggested by Larson. Larson discloses networks that establish connections from requestors to responders by relaying requests through switches. Each switch routes the requests using the information contained in the requests that switch handles. (Abstract of Larson)

If the examiner contends that the "requestors" and "responders" of Larson correspond to the "first device" and "second device" of claim 18, respectively, then Larson does not disclose or suggest that the requestors are pre-configured to generate N signals having a first ordering, and the responders are pre-configured to accept the N signals arranged in a second ordering.

All of the dependent claims are patentable for at least the reasons for which the claims on which they depend are patentable.

Canceled claims, if any, have been canceled without prejudice or disclaimer.

Any circumstance in which the applicant has addressed certain comments of the examiner does not mean that the applicant concedes other comments of the examiner. Any circumstance in which the applicant has made arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims. Any circumstance in which the applicant has amended or canceled a claim does not mean that the applicant concedes any of the examiner's positions with respect to that claim or other claims.

Enclosed is a $200 check for excess claim fee. Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: 7/26/2006

Rex I. Huang
Reg. No. 57,661

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906